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SOME GERMAN EXPERIENCES IN THE TREATMENT OF THE NERVOUS FORMS OF CANINE DISTEMPER

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Most valuable advances have been made during the last few years in our knowledge upon the epidemiology, pathogenesis and prophylaxis of canine distemper. These advances we owe, for the most part, to British and American workers. In particular, in the field of immunisation, a re-awakening of interest has taken place following upon the studies of R. G. Green in America, pointing to the possibility of adopting entirely new methods of intervention. This relates especially to the work accomplished by him in respect to the effects of the so-called interference phenomenon in modifying the course of natural attack. Again, from the German standpoint, much credit is due to the British workers, MacIntyre, Trevan and Montgomerie, for having thrown some light upon the pathogenesis of the different forms of canine encephalomyelitis. Moreover, the possible existence of plurality among strains of the distemper virus suggested by their work accords well with the present author's own experience, though until now he had not been able to obtain experimental proof. Thus the differentiation between hard pad disease and the classical forms of distemper enabled him to appreciate from the available literature the significance of his own discovery of the former condition for the first time in Germany in 1948.

These striking advances, which are now gratefully acknowledged by Continental workers, have not been accompanied by corresponding reports on successful therapy. The most recent accessible British and American publications have been confined in this respect to symptomatic treatment and the degree of success falls short of expectations. Work upon this problem undertaken at the University of Berlin Clinic for the Smaller Domesticated Animals has now reached a stage when it can be declared that provided treatment is undertaken in stipulated conditions, the nervous sequelae of distemper then will be found to lose most of their terrors. The success which has followed the application of similar measures at other German clinics has now prompted the present author to place his results at the disposal of his British veterinary colleagues.

During the last World War the clinical picture of distemper was found to have become changed, its course becoming more malignant, with a greater tendency for the development of nervous complications, as sequelae, than formerly. A stage was reached finally when some observers even began to doubt whether the devastating canine scourge confronting them since the war was indeed still to be conceived as true distemper or as a different, more malignant, disease. Veterinarians whose duties had caused them temporarily to suspend their professional work had perforce to relearn entirely their own problems. German veterinarians to whom the literature of other countries was not readily available until the end of 1947 were tempted to blame the lack of response of the organism caused by food scarcity as the obvious reason for the increased malignancy of canine distemper. However, it was noteworthy that those dogs which belonged to members of the Allied Occupation Forces in Germany and were much better fed than those kept in German households fared no better, in so far as the attacks of distemper suffered by them were certainly not milder. After the British, American, French and Dutch journals had again become available, that explanation was at once exposed as a fallacy, for even in countries like America where neither during nor after the war had there been any food shortage distemper had also undergone a clinical change towards greater virulency. Consequently, some other factors must have operated to produce an over-all change in the classical syndrome.

The main reason for the change must be sought in the variations now known doubtless to arise commonly among the pathogenic viruses. Furthermore, with increasing knowledge upon the meaning of allergy and the nature of allergic diseases a corresponding change is taking place in all our conceptions regarding medicine. Hence, the question arises whether or not certain disturbances in the central nervous system observed as sequelae after the remission of an attack of distemper can be attributed to a neuro-allergy. This explanation is suggested, too, by the observation that the only histological change discoverable occasionally is a pial oedema, *i.e.*, an inflammatory serous exudation in the pia mater. More than ever, we find ourselves confronted with the task of studying the changes in the central nervous system inasmuch as the bulk of cases exhibiting the usual catarrhal, pectoral, and intestinal symptoms terminate by showing nervous disease.

Experimental treatment of distemper-encephalitis as carried out by us before this last war failed to yield satisfactory results. Conventional therapy failed nearly always to produce a cure. The data upon therapy published in the foreign literature were also disappointing. In the first place, therefore, some clarification upon the situation was essential to enable us to decide whether the disease condition had remained the same (even though it might have become modified in some respects) or whether there had entered into the picture a series of actually different diseases of viral or bacterial origin. For this purpose it was necessary to study the international literature which was often only available to us in the form of abstracts.

After surveying the most recent publications one is forced to come to the following conclusions :—

(1) There are no fundamental differences between distemper as it now occurs and as it prevailed in former times. Some exception may perhaps be proved to have arisen in respect to Verlinde's " true encephalitis." Variations in the incubation period and in the duration of successive clinical stages suggest modifications in the pathogenic properties of the virus and nothing else.

(2) The available data are insufficient to warrant definitive judgments. Much painstaking research is still necessary. The present author recommends team-work among British,

German and Dutch workers more especially, because of the differences in the pathogenicity of the virus which have been reported to have arisen in the respective countries.

Examinations carried out upon an extensive material have made us suspect that we are now dealing with a modified distemper. As evidence for the existence of a plurality of viruses, we need only refer to the so-called " dry-distemper " first described by Pugh and then by Green and his co-workers who first demonstrated it in foxes as an infection which was transmissible to dogs and was capable of breaking down in them the immunity following immunisation by the Laidlaw-Dunkin method. The clinical symptoms were very similar to those of distemper and the nervous complications were identical.

The conventional forms of therapy adopted by us as well as by other workers produced entirely disappointing results. In the German literature the administration of a mixture of bromine compounds is frequently recommended but in no case were we convinced that an amelioration was produced by this means. Organic and inorganic compounds of phosphorus and arsenic, trypaflavine (intravenously), vitamin preparations, sulphonamides and, more recently, antibiotics, have, in turn, been recommended, and are still used, only to disclose that certain workers do not trouble to render themselves conversant with the specific mode of action of these several medicaments. After surveying the Anglo-American literature, Leon gives a useful summary of the preparations prescribed in these countries. To produce a sedative effect, nembutal proved satisfactory. Nevertheless, despite this effect, Leon stressed that the disease progressed, with temporary suppression only of the symptoms. Vitamin B compounds likewise proved to have no influence upon the outcome of the disease, an observation which coincided entirely with our own experience. For, even after administration of the vitamin B complex at the highest recommended dosage, no tangible results could be proved. Vitamin C proved of as little use in our own studies as it had done in Leon's. MacIntyre, Trevan and Montgomerie emphasise the importance of dietary measures, and, reporting failure of anti-serum in cases with nervous complications, express the opinion that diets rich in vitamins enhance the efficacy of treatment. We find ourselves, however, unable to accept the findings of Minda, who recommends intralumbar injection of penicillin in the treatment of distemper encephalitis. Apart from the fact that there is no theoretical basis for the employment of that antibiotic, we well know that intrathecal injection of penicillin produces severe, and usually fatal, intoxication. Verlinde and Ojemann recommend intramuscular injections of "*Pernaemon forte*," a liver preparation which owes its activity to its content of the anti-pernicious anaemia factor rather than to its content of vitamin B. A relationship between these two substances or classes of substances has been known to exist for several years. We have, however, employed liver preparations in the treatment of several such cases of canine encephalitis, with no success.

No clinician who bears in mind the full meaning of encephalomalacia and neurophagia, in which the ganglion cells are absorbed and replaced by glia cells, will entertain exaggerated anticipations in regard to any medicament—or, at least, he will exclude those cases which he has good reason to look upon from the very beginning as hopeless, and thus avoid waste of drugs, time and effort. The procedure often seen in which patients are still treated that have been fevered for weeks and are showing symptoms of rhythmic myoclonia, with or without a paresis or paralysis of their hind legs resulting in intense emaciation, must be adjudged unwarrantable in the interests of the owner and ought therefore to be dropped.

It is fundamental in all successful therapy to employ nothing that is merely either palliative or suppressive. Basing prognosis upon the histological changes commonly known to take place in the nervous forms of distemper we can formulate a few principles with some exactitude in the selection of cases likely to be amenable to treatment. We need not, however, go to the other extreme and range ourselves with those workers who destroy immediately every case of nervous distemper. We know from clinical experience that, in spite of all, complete cure can be obtained in a certain, by no means negligible, percentage of cases. On the other hand, we resolutely refuse to treat cases in which the prognosis is hopeless and we stop treatment immediately if in its course disturbances occur indicating irreparable damage to the central nervous system. The sensible owner invariably will be thankful for a rational explanation and advice as to early destruction especially when he has witnessed already his animal suffering from meningitis throughout a whole night or several nights. It is well known that such patients start whining and howling about 9 p.m. and continue to do so until sunrise.

The following procedure has been found satisfactory at our clinic in arriving at a prognosis in the various forms of distemper :—

Dogs showing masticatory cramps with high fever, especially if the temperature rises above 103·5° F., are excluded from treatment. Those showing temperatures between 102° and 103° F. with no distinct emaciation are admitted for treatment, but the treatment is only continued so long as there is no additional rise in temperature. If the temperature approaches 103·5° F. at the second or third visit treatment is discontinued, and after consulting the owner the dog is destroyed. No attempt at treatment is made in cases of rhythmic myoclonia, that is to say in the condition wrongly termed *tic*, where there are seen clonic convulsions involving certain muscle groups. Even if the patient does not always succumb to attack, these convulsions, though maybe abated, persist throughout life. Neither is treatment attempted in cases of paresis or paralysis with a temperature exceeding 103·5° F., nor in those cases with a temperature between 102° and 103° F. when there co-exists a severe rhinitis because in such patients usually there develops a meningo-encephalitis as a sequel, which can possibly be explained as an ascending infection *via* the lymphatic sheaths of the olfactory nerve. When the patient exhibits tonic-clonic spasms with transitory mental confusional states treatment is begun only if (*a*) there is no fever, (*b*) convulsions are not frequent, (*c*) the ravenous hunger (bulimia) seen often following such convulsions is not intense.

In selecting the temperature of 103·5° F. as the arbitrary constant in the fever scale experience has taught us that it can be relied upon in critical prognosis whether the patient belongs to one of the larger breeds or to the Bedlington with a normal body temperature of about 100·5° F. or to one of the smaller breeds with a normal temperature of about 102° F.

During an experience extending over 20 years all drugs that have been recommended in the treatment of nervous distemper have been clinically tested by us if their use could be justified on pharmacological grounds. Only a very few of the multitude tested have proved useful and are worthy of consideration. From the experiences gained in human medicine one would be tempted to repose faith in preparations embodying the vitamin B complex as the drugs of choice, but the various classes of cases treated, including those of chorea, failed to give a satisfactory response. Within the limits of prognosis stipulated above, therefore, treatment ought not to be attempted in cases which appear hopeless from the outset; especially should care be taken not to engage in the kind of polypharmacy resorted to by many practitioners.

The sulphonamides ought not to be used, for they cannot be expected to give satisfactory results since there is no bacterial invasion of the central nervous system and the viruses are not affected by them. No parallel can be drawn with human cerebrospinal meningitis caused by the meningococcus, which responds remarkably well to treatment with some of the sulphonamides as well as to the antibiotics.

Attempts were repeatedly made to treat cases with pronounced hysteria superimposed upon mental dysfunction by anaesthesia induced through intramuscular injection of barbiturates, anticipating that an enforced sleep of several hours' duration would cause some subsidence of the inflammation affecting the cerebrospinal system. The only benefit obtained, however, was the knowledge that, pharmacologically, a dosage which hardly produces even any sedative effect in normal animals induces within five minutes sound sleep in animals suffering from nervous disturbances. This phenomenon is doubtless related to changes in the lipoid metabolism of the nervous system and is under study. The course of the disease, however, was not permanently influenced in any way by the treatment and after an interval of one to three days the dog again developed hysteria and died, if it had not already been condemned to destruction. Thus, such cases, even if afebrile, must be excluded from treatment.

The effective treatment developed by us is exceedingly simple. The patient is placed in a darkened room and a cerebral sedative perorally administered in the shape of a barbituric acid preparation. For this purpose we have used "*luminalettes*," small tablets each containing 0·015 g. (gramme) diethylbarbituric acid, at the rate of two to four tablets daily depending upon the size of the animal and the frequency of the fits. A barbituric acid compound (luminal) was chosen because, contrary to the bromides, this acts selectively upon the nuclei of the basal ganglia (hippocampi) of the brain stem and so counteracts directly the tendency to excitation leading to convulsions. These ganglia, it is known, are not influenced by bromides. Such treatment alone does not, however, achieve the desired end, and so we combine the feeding of "*luminalettes*" with subcutaneous injection of an anti-epileptic agent extracted from the venom of rattlesnakes (*Crotalus* spp.). This preparation, marketed under the trade name "*epileptasid*," is a sterile, stable aqueous solution of the toxin of different rattlesnakes containing 0·04 mg. in each 1 c.c. (ml.) with added preservative. This small dose can be regarded as entirely harmless and we never observed signs of over dosage even in small dogs. The mode of action of this preparation has not yet been clearly demonstrated, but its introduction into this form of therapy originated from the observation that an epileptic native bitten by *Crotalia* sp. remained cured of his epilepsy when he had survived the direct effects of the lesion caused by the bite. Though the cramps following post-distemper meningo-encephalitis are epileptiform in nature they have nothing in common with true epilepsy, which has never yet been demonstrated in dogs. The mode of therapy prescribed is therefore merely symptomatic, but nevertheless it has proved so valuable that we consider the administration of "*luminalettes*" and "*epileptasid*" in combination the method of choice in treatment and superior to every other form of treatment hitherto recommended. Numerous studies have shown that neither barbituric acid nor crotalotoxin administered alone will produce satisfactory results but that the therapeutic activity depends upon the two administered in combination.

Although there is little risk of overdosage we keep the dose rate low, and, depending upon the size of the dog, we inject 0·2 to 0·4 c.c. (ml.) subcutaneously, repeating the injections every third day. At the same time, we stress to the owner the need to give the "luminalettes" regularly by the mouth. There is no need to give more than six injections. If there is no improvement after the fourth injection, at the latest, no hope of success can be entertained from continuing the treatment further. In most cases, cramps, more especially masticatory cramps, subside appreciably immediately after the first injection or, at least, become less frequent and intense, and then disappear permanently after the second injection. It would be unwise to stop treatment at this stage. The luminalettes should be given for at least ten days if not longer, or relapses may occur. Our impression is that the "*epileptasid*" merely ensures the barbituric acid preparation traversing its way to the brain, for dogs that had received luminalettes, or some other sedative, alone, remained as little relieved as those that had received epileptasid only. The treatment now described must be continued until the patient shows an entirely normal appearance lasting for several days and then the dosage of luminalettes is gradually reduced.

Another sedative formerly employed, namely, "*mistura nervina*," a combination of the usual three bromine compounds, sometimes given with morphine or with chloral, *per os*, failed to produce satisfactory results and was discarded in favour of the "*luminalettes*." We recommend, however, in convulsive states the application of cold packs to the head which appear to be beneficial. Finally, in all treatment of the above kind we would again stress the importance of rigid selection of cases and the stopping of treatment if the temperature exceeds 103·5° F. To be excluded as hopeless are cases of cerebellar ataxia, in which the cerebellum has become affected. In cases of rhythmic myoclonia the above treatment also resulted in complete failure.

The so-called "Bulgarian course" recommended in similar states in man, in which the essential principle is the atropinic action of the treatment, failed to effect improvement in any of our cases. The same held true with the "bee-venom" treatment recommended by some Dutch authors in such states. It should be noted that occasionally spontaneous cure results, which, however, can in no case be predicted. Such spontaneous cures may accidentally arise during application of a given treatment and a favourable outcome imputed to it which cannot be reproduced afterwards in controlled conditions.

Somewhat more favourable from the standpoint of prognosis are those cases of distemper myelites, but the long duration of treatment in such cases imposes a heavy strain on the owner's patience. In these cases, too, a rigid selection is made, in the manner indicated above. Treatment is definitely contraindicated in those cases showing fever and a pronounced disposition towards cramps as evidenced by slight jerks in certain muscle groups. In the literature, strychnine administered perorally or injected parenterally in the form of Tinctura nucis vomicae is generally considered beneficial in post-distemper myelitic states. The peroral action, however, is too weak, for the drug then acts as a stomachic stimulant rather than as a neuro-excitant. The special preparation, "*Myelit*" (compounded upon a strychnine basis), has satisfied all the needs for which this drug usefully can be employed in canine practice. The compound contains hydrolysed lactalbumins with the addition of strychnine as well as of arsenic in organic combination. The lactalbumins produce a non-specific activation of the protoplasm and for this purpose care is taken in manufacture not to eliminate completely the milk casein. The strychnine component to which the preparation owes its specific action is well known to have a selective action upon the nervous system, affecting both the sensory and motor reflex arcs and ensuring more ready transmission of stimuli to the peripheral organs. It considerably improves sense perception, especially hearing and vision. The organic arsenious compound, the second component of

the preparation, was introduced because of the action of arsenic on the protoplasm in increasing assimilation and decreasing dissimilation of amino-acids in the body, thus counteracting the tendency towards the extreme debility observed as a sequel to distemper. Besides, arsenic is also well known to have a beneficial effect on the nervous system in cases of disordered function and in some pathological states, when small doses will bring about amelioration. One ampoule of " Myelit " contains 0·001 g. (gramme) strychnine nitrate and 0·03 g. organically bound arsenic in 5 c.c. (ml.) hydrolysed lactalbumins. The preparation was so compounded that 0·5 c.c. per kg. bodyweight could be safely (*i.e.*, calculated on the strychnine content) and conveniently injected intramuscularly. This dose was administered every third day; no risk of a cumulative action of the strychnine need be apprehended when the drug is administered in this way.

Some writers have repeatedly advocated fever-therapy in the treatment of post-infective myelitis in dogs on an analogy with what has become established practice in human neurology (in dealing with such conditions as general paralysis of the insane). We have also endeavoured to proceed in this manner with dogs, to find that, contrary to what has been reported in such affections in man, the clinical course was not only unchanged but acute impairment occurred in almost every case. Without exception, the morbid processes became activated and unfavourably influenced. This observation has a simple pharmacological explanation. Fever therapy in man is applied only in chronic cases showing pathological hypertrophy of the glial cells and involvement of the neuroblasts in this infiltration. Distemper myelitis, on the other hand, exhibits acute inflammatory changes which are intensified by fever therapy. The use of pyretics in this way in post-distemper myelitis, as well as also in encephalitis, can thus be compared with the application of wood-tar or other dermal irritants in cases of acute inflammatory dermatitis. Acute exacerbation is the inevitable result. In cases of distemper myelitis which have been afebrile until the induction of pyrexia the prognosis thus becomes considerably impaired. Hence, a parallel is set up with those cases characterised by intermittent spontaneous rise of temperature. Such cases, as already said, can never be cured.

A few years ago Prostigmin, a most interesting preparation pharmacologically, was introduced into human medicine for the treatment of *myasthenia gravis*. Veterinary practitioners, more especially in Britain and Holland, were therefore prompted to try it upon distemper myelitis. This drug derives its specific action through its effect in blocking cholesterinase-activity, thus enabling acetylcholin to fulfil its normal physiological functions. Cases treated by us yielded results that were not unequivocal and were certainly not conclusive. We have therefore given definite preference to " Myelit," or strychnine, therapy, which, apart from its superiority, is far less expensive.

The procedure recommended by us, we freely confess, excludes many cases of meningo-encephalitis from the very outset and attempts only to save patients in which the prognosis is hopeful. It has, however, the great merit that it remains within the bounds of possibility and avoids waste of the owner's money as well as wastage of our own preparations upon obviously hopeless cases. Formerly, we repeatedly endeavoured to save the lives of patients suffering from post-distemper meningo-encephalitis or those showing rhythmic myoclonias. Such animals sometimes survived for weeks or even months but with such degree of acute impairment that the inevitable outcome was catastrophic symptoms leading to a fatal issue. Our moral duty, therefore, we believe, is only to accept for treatment such animals as those in which ultimate recovery seems reasonably possible. That favourable outcome cannot, however, be predicted in a considerable proportion of cases of nervous distemper. Painless destruction in such hopeless cases, after duly consulting the owner, will always be much appreciated.

Summary

(1) Like many other infectious diseases, canine distemper has presented a changed clinical picture during the last few years, thus leading some authors to suspect that they are dealing with a new epidemic disease.

(2) Changes are produced in the histopathology of the central nervous system in cases of post-distemper encephalitis, myelitis, and encephalo-myelitis, which are frequently irreparable. For anatomical reasons, no hope of a cure can be entertained in such cases.

(3) The most favourable cases of post-infective meningo-encephalitis or myelitis from the standpoint of prognosis are described, in which treatment can be attempted with some hope of success. Patients showing febrile symptoms, especially those with temperatures exceeding 103·5° F., should be excluded as hopeless.

(4) In the treatment of meningo-encephalitis the combined administration of a barbituric acid preparation (" *luminalettes* ") and crotalotoxin (" *epileptasid* ") is far superior in its effects to all other measures hitherto recommended. Prognosis in this form of distemper has therefore now become more favourable than formerly. In the treatment of post-infective myelitis a special German preparation (" Myelit "), in which the active ingredient is strychnine, has proved superior to all other medicaments recommended in the literature. Fever-therapy was invariably followed by acute impairment in cases of meningo-encephalitis and myelitis and the method was eventually discarded. From the general therapeutic standpoint there could also be no justification for the adoption of this treatment.

(5) Sulphonamides and antibiotics failed to exert any beneficial influence upon the nervous complications of distemper. The failure could be anticipated, as these complications do not arise through bacterial invasion. Other therapeutical methods, as, for instance, the administration of vitamin B preparations, anti-pernicious anaemia treatment (" Pernaemon "), and prostigmin, which have in turn been recommended during the last few years, were tested. They were all found to be either ineffective or only of doubtful value.

Acknowledgment.—We have to thank Dr. J. T. Edwards for the above revised rendering of our text which has been entirely re-written by him and is faithful to the German original forwarded to him at his request for accurate check.

FEEDING-STUFFS (RIDING HORSES)

In the House of Commons on April 6th, Sir T. Moore asked the Minister of Food whether, in view of the improved position with regard to feeding-stuffs and the desirability of encouraging recreational facilities, he will now provide cereal rations for riding school horses.

Mr. Webb: For the present our supplies of feeding-stuffs must be used principally to increase rations for farm livestock, and we cannot yet allow rations for all riding horses. The claims of riding schools among others will be considered when supplies improve sufficiently.

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Aortic Substitution.—The Henry Ford Hospital at Detroit reports that two of its surgeons, Doctors Conrad Lam and H. H. Aram, have successfully replaced, in a 57-year-old patient suffering from an aneurism, a 6-inch section of the aorta with a section of an aorta taken from a dead man five days before and preserved in penicillin and blood plasma.

TUBERCULOSIS OF THE UDDER AND ITS DIFFERENTIAL DIAGNOSIS*

BY

J. WEIR AND D. BARBOUR

Introduction

In attempting to describe tuberculosis of the udder and its differential diagnosis, it is difficult not to make some reference to routine herd examinations. When all is said and done, most cases of this disease are found during the course of such work, and while mention will be made occasionally of herd inspection, it is not intended to deal with this subject as such. The real object of this article is twofold. Firstly, to try and present the outstanding features of tuberculosis of the udder to act as some guide to those confronted with the task of detecting this disease for the first time, secondly and especially, to stress the importance of the clinical aspect. There is a great and growing tendency when carrying out herd examinations for samples of milk to be collected from quarters which show an induration without any attempt being made to diagnose the condition, and if such samples prove negative no further action is taken. In other words, the microscope is used to make the diagnosis. By so doing many cases of tuberculosis of the udder are missed or not detected as early as they might have been. Worse still, the farmer, knowing a sample of milk has been taken, and assuming the udder to be healthy because he has received no notice to the contrary, sends the milk for human consumption. It cannot be stressed too strongly in this connection that the microscope should be used to confirm a diagnosis only and not to make it. Further, if the microscopic examination of a milk sample proves negative, the question has still to be asked if it should be sent for biological test. This can only be answered if a careful assessment has been made of all the clinical symptoms.

There is no doubt that at present the greatest deterrent to sending individual samples of milk for biological examination is the question of the service of Form A under the Tuberculosis Order. If one has reasonable grounds for suspecting tuberculosis of the udder, there is a moral as well as a legal obligation to do so. On the other hand, there is a responsibility to the owner. Here again the correct course can only be followed after weighing up the clinical features presented.

The clinical diagnosis of tuberculosis of the udder in the cow is usually a comparatively easy matter when the case is reported by the owner. By that time disease is generally well established, and presents all or most of the characteristic features. Its detection during the course of routine herd examination, however, is often not quite such a simple matter. In fact, this can be one of the most difficult duties which a veterinary surgeon is called upon to perform. Then he has to rely entirely on his own clinical skill without the assistance of any history which, even if available, can, intentionally or otherwise, be very misleading. In this connection, experience shows that if any information supplied by the owner tends to confirm the impressions of the examiner it may be accepted, but he should be very chary about being influenced by a history which does not conform to his own opinion. As a further complication such work carries with it a grave responsibility to the public especially children, a responsibility which it is well to keep in mind at all times.

Like many other duties the examination of the cow's udder calls for a routine method with a view to making sure that the whole gland is thoroughly palpated, and at the same time having regard to personal safety. For this purpose it is essential that the examiner stands beside the cow with his back to her head and the arm next her over the sacrum, and with the other hand, each fore quarter is carefully palpated, secondly the space between the fore and hind teats, thirdly the area behind the back teats, and finally the postero-superior aspect of the hind quarters including the supra-mammary glands where possible. Apart from examining each quarter, a careful comparison should be made between the corresponding quarters, but allowance must be made for cases where both quarters are affected. If this position is adopted, the point of the elbow of the examining arm can be rested on the knee of the corresponding side and the leg thus brought into play to exert additional pressure during palpation. This not only makes for greater efficiency but also lessens the strain considerably when a large number of cows have to be examined.

It is generally believed that tuberculosis of the udder in the hind quarter commences in the postero-superior aspect. Reference will be made to this point later, but it can be said now that we disagree with this view. It is also generally accepted that disease is found more often in the hind than in the fore quarters. While for some reason or another this is true, it is not so uncommon in a fore quarter as one is led to believe. There is no doubt that these two impressions have gained credence due to the tendency of many veterinary surgeons to carry out their examinations from behind the cow. By so doing early tuberculosis in the hind quarter is easily missed, and an adequate examination of the fore quarters cannot be made. The importance of these two points from a diagnostic point of view will be dealt with when describing the lesions.

While discussing the method of examination, there cannot be stressed too much the absolute necessity for becoming thoroughly familiar with the " feel " of a normal udder both when dry and in milk. This may seem of little importance, but the texture of the normal udder varies a great deal from cow to cow, from herd to herd, and even between breeds.

TUBERCULOSIS OF THE UDDER

General

Tuberculosis of the udder is generally described as a slowly progressive painless induration affecting one or more quarters. Disease can occasionally develop in quite a short time, however, and cases have been seen where well-marked lesions have appeared within three weeks. Conversely, others have been observed where the induration has become very much reduced in four to six weeks. In some cases it has been known to disappear completely, at least as far as could be detected by ordinary palpation, and considering the nature of a tuberculous lesion these cases are very difficult to explain. The fact that such incidents can happen, however, makes it imperative that an accurate description should be made of any cow from which a sample of milk is taken, and which is sent for a biological examination.

On very rare occasions, pain can be present. This is invariably slight and is associated with acute cases which always show well-marked interstitial induration. *Post-mortem* examination also reveals large caseating areas surrounded by a hyperaemic zone.

The induration produced as a result of tuberculosis calls for special attention in that it presents certain features which might almost be regarded as characteristic irrespective of the size or shape of the lesion. It has a stony hard, roughish feel about it which when felt by experienced fingers immediately conveys the impression of tuberculosis. It is well-nigh

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impossible to describe its texture on paper, but in all cases where the presence of disease is established the lesion should be palpated repeatedly from as many angles as possible and by each hand separately, so that the finger-tips may become attuned to its detection. Only thus can the true character of the induration be appreciated. As a result of long experience some veterinary surgeons assert that the fingers of their one hand have become more sensitive to this touch than those of the other. This is undoubtedly true and such experience merely emphasises the fact that there is that something about a tuberculous induration which, as a rule, is different from any other.

Broadly speaking, the induration resulting from tuberculosis of the udder may be classified from a clinical point of view as (1) interstitial and involving the whole quarter or a limited area, or (2) nodular. The nodular type is generally regarded as being more common and no doubt this false impression has been created in the mind of the inexperienced by the character of tuberculous lesions elsewhere in the body. The interstitial form, however, occurs most frequently and while the lesion is made up of a large number of the usual tuberculous foci, the end product is a solid mass.

In tuberculosis of the udder the skin is normal, freely movable, and unattached to the underlying tissues. When using this feature as a means of differential diagnosis care should be taken to make sure that a blister has not been applied to the affected quarter by the owner. With the introduction of modern drugs such a practice is falling into disuse, but its effect produces a thickened painful oedematous condition of the skin varying in intensity according to the severity of the blister or rubifacient applied. Instances have been seen where the combined result of tuberculosis of the udder and a strong irritant have produced a condition similar to an acute streptococcal mastitis.

The teat duct appears normal. There may occasionally be slight thickening as a result of a previous attack of mastitis, but the presence of a normal duct is an extremely important point when trying to assess the nature of an induration in the corresponding quarter.

Tuberculosis of the Hind Quarter

Tuberculosis tends to take a different form in the hind quarter as opposed to the fore quarter. Consequently, it is proposed to deal with these separately. The hind quarter is generally affected with the interstitial type of induration and often the whole quarter is involved, giving the impression that the affected quarter has been moulded out of a piece of wood. It may appear normal in size or only slightly enlarged, but frequently it is distinctly hypertrophied, and in this case the udder, when viewed from behind, may have a distinctly lopsided appearance due to the weight of tuberculous material as well as the hypertrophy. Palpation reveals the characteristic "feel." The opening into the milk cistern is quite patent and if an attempt is made to push the finger into this orifice the edge feels hard and gritty. This feature when present is diagnostic of tuberculosis. The induration in front of the teat is also well marked and there is always a very distinct line of demarcation between the fore and hind quarters, that is, between healthy and diseased tissue. This very definite line cleavage in the case of tuberculosis is an extremely important point in connection with this disease and will be referred to later under differential diagnosis. Early interstitial tuberculosis affecting the whole of a hind quarter presents all the above features but to a lesser degree. At times it may be difficult to determine whether the one quarter is affected with tuberculosis or the other simply atrophied. In such cases it is good practice to have both quarters milked out when the induration and other symptoms referred to above become much more apparent, and the normal character of the other quarter will be more evident. Occasionally both hind quarters are affected at the same time, and even although there is no normal quarter with which to make comparison, there should be no difficulty in diagnosis to anyone familiar with the symptoms we have described.

In the hind quarter, areas of limited induration are quite common. These are usually found in front of the teat either alone or in conjunction with a similar lesion in the postero-superior aspect. In the former position the area of induration fills the curve formed by the forefinger and thumb when the hand is half open and gradually merges into the healthy tissue towards the rear. In many cases the induration does not extend even as far as the teat. Again, there is the well-marked line of demarcation between the fore and hind quarters and it is also here that the induration assumes the most characteristic "feel" which one associates with tuberculosis. The postero-superior lesion may appear normal to the eye, but is firm when compared to the corresponding area in the other quarter. This induration is most marked at the top and gradually disappears in a downward direction. When these two lesions are present in the one quarter the intervening udder tissue feels quite normal, but as the age of the lesions increases there is a tendency for them to merge. Such a distribution of lesions, that is anteriorly and postero-superiorly, is very suggestive of tuberculosis if not entirely diagnostic. In a hind quarter affected with such area lesions it often appears normal in size except when the cow has just been milked or is dry.

It is generally believed that tuberculosis in the hind quarter commences in the postero-superior aspect. Experience shows quite definitely that this is incorrect. It is very common to find limited area lesions in this position and in front of the teat at the same time, but postero-superior lesions are never found alone. On the other hand, one frequently finds lesions in front of the teat, but none elsewhere. As already stated, this erroneous impression has probably been created by the wrong practice of examining the cow's udder from behind, when, of course, the postero-superior lesion will be quite evident but the other easily overlooked.

In addition to the interstitial type, one occasionally finds nodular lesions in the hind quarter. These nodules are tumour-like and may vary in size up to that of a tennis ball. They are irregularly round, rougher to the touch than the interstitial lesion, although of the same consistency, and are in the substance of the udder. There may be only one present, or there may be quite a few, and are seldom found in front of the teat. Generally, they are separate entities, but occasionally they may be connected, when the affected quarter is quite often slightly atrophied. The presence of such nodules in the absence of a history of mastitis, injury, or other specific condition, is very suggestive of tuberculosis.

Tuberculosis of the Fore Quarter

Tuberculosis of the fore quarter presents rather a different picture. Here the interstitial type of induration is the exception rather than the rule and when it does occur disease is usually acute and more than one quarter is often affected. In such cases the symptoms are the same as those present in the hind quarter when it is similarly affected. On the other hand the nodular type of induration is common in the fore quarter compared to the hind. The nodules are generally more numerous and vary in size from that of a hazel nut up to that of a tangerine orange. Larger single tumour-like lesions are occasionally found, but generally the size of the nodules is in inverse ratio to the number. These nodular lesions are

frequently found round the margin of the quarter, especially in front, leaving an area of healthy tissue in the centre, and in some cases they form quite a definite ring. At other times the nodules appear to be connected, giving the impression of an irregular nodular mass, which may more or less fill the quarter. In this event the clean-cut division between the fore and hind quarter is again evident.

Tuberculosis affecting all Four Quarters

When all four quarters are affected, some difficulty in diagnosis may be experienced. The cow has a good "show" but the owner often volunteers the information that the amount of milk she is producing is very small compared to her apparent potentialities. Here, again, it is advisable to have the cow milked. This produces little or no difference in the size and character of the induration, while the presence of normal teats and the well-marked entrance to the teat cistern should arouse suspicions at the very least. When all four quarters are affected the interstitial type of induration is invariably present and involves the whole of each quarter.

Mammary Lymphatic Glands

While it is always policy where possible to examine the mammary lymph glands, this is really only of value in a negative sense. In cases of tuberculosis of the hind quarter the corresponding gland is generally enlarged. The same is true of other affections of the udder and unless tuberculous nodules can actually be detected it is impossible by palpation of the gland to diagnose the condition in the quarter. It is an entirely different matter, however, when one gland is enlarged and the corresponding quarter is perfectly normal; here enlargement is often due to tuberculous infection. The presence of a gland in which definite indurated nodules can be felt is diagnostic of this disease. Instances have been seen where an affected gland has been as big as a cocoanut and at first sight it may be difficult to appreciate the exact condition. In these the gland projects towards the rear, overlaps the upper aspect of the corresponding quarter, and feels uniformly hard due to the fact that the normal glandular tissue has been entirely replaced by a mass of tuberculous material. Such a condition can easily be mistaken for an induration of the upper part of the hind quarter, but the area of induration ends very abruptly and is of course convex in outline. Further examination will also show that it is freely movable and it will be possible to push the fingers a certain distance between the gland and the udder.

Macroscopic Appearance of the Milk

The macroscopic examination of the milk or secretion from a suspected quarter can at times be a very useful aid to diagnosis. Generally it is white and cannot be distinguished from normal milk, but as the age of the lesion increases, the colour changes through an off-white to an amber with a corresponding increase in the amount of deposit. This may vary considerably in quantity and consists of very fine flocculi. When first drawn, this amber secretion may be opaque, but on being allowed to stand the deposit very soon settles to the bottom of the receptacle, leaving the supernatant fluid perfectly clear. This clear amber colour is diagnostic of tuberculosis and is invariably associated with old-standing cases. If shaken as soon as drawn it will be noticed that this fluid has a very soapy frothy appearance. In the course of routine herd inspection dry cows should be examined wherever possible. Not only is it then a comparatively easy matter to diagnose tuberculosis of the udder clinically, but an affected quarter will always yield a secretion which shows this typical colour. Incidentally, it is a characteristic feature of tuberculosis of the udder that an affected quarter will always yield ample secretion for examination whether the cow is dry or in milk irrespective of the age of the lesion.

The secretion from a quarter affected with a non-tuberculous mastitis when examined macroscopically on the spot, or particularly after being allowed to stand for an hour, can show tremendous variations. The deposit is generally coarser than that from a tuberculous quarter and more curdled in appearance. Both the supernatant fluid and the deposit may show distinct layers due to difference in density or colour. It is impossible to describe all the variations in the secretions from such quarters but by co-relating the results of microscopic examination with the naked-eye appearance of the secretions on being allowed to stand, much useful information can be obtained for future guidance in differential diagnosis.

DIFFERENTIAL DIAGNOSIS

General Remarks

The question of differential diagnosis between tuberculosis of the udder and other affections is not an easy one, the chief difficulty being that infections other than tubercle bacilli can produce fibrosis varying in extent. Apart from pathological conditions, however, there are certain quite normal features which can be rather confusing and of which the following are some examples. When palpating the region between the fore and hind teats, one often feels a slight firmness particularly in young cows. As a similar state of affairs cannot be found on reaching through to the other side one's suspicions might be aroused. But going to the other side of the animal and taking up the same position a similar condition will be found, whereas that on the original side cannot now be detected. In other words, a certain area may be perfectly normal but feel firmish when grasped from certain angles. Similarly, many cows, especially Ayrshires, show a very prominent ring of healthy tissue at the front edge of the fore quarter. In some cows this might be mistaken for early tuberculosis, especially since this is a predilection site. It will be found however that there is a similar prominence in both fore quarters and that the udder tissue is perfectly normal.

In newly-calved cows particularly, one frequently finds a duct in the groove between the lower halves of the two hind quarters. We are not aware of its exact name or function and although only palpable in some cows appears to be a normal feature. Often it is as thick as one's finger, frequently varicosed, may show piping, and sometimes contains indurated nodules about the size of peas. If traced in an upward direction, it will be found that this duct diverges to one side, often the left, and merges with the corresponding quarter. At this point it may give the impression that the quarter is enlarged. No definite induration is present and the presence of the duct can easily be traced. When nodules are felt it is quite an easy matter to determine that they are in the lumen and even when the duct shows piping the resulting irregular varicose induration should not give rise to any difficulty.

The presence of small active supernumerary quarters can also be rather confusing at times. These may be present without a corresponding teat and even when one is there the quarter itself may be as much as two inches from it. Such supernumerary appendages are usually found at the back of the hind quarter, but it is not uncommon to find them lying between the fore and hind quarters near the median line and it is here that they may cause most difficulty in detecting their exact nature. They are always circular in shape, and have the feeling of being attached to the surface of the udder rather than in its substance. If healthy, they show no induration and even at worst have the feeling of healthy udder tissue gorged with milk. If a teat is present it gives, of course,

the correct clue and even if some distance away, the teat duct can always be traced to the quarter.

If one quarter is slightly atrophied it may appear as if the quarter on the other side is slightly enlarged and if in addition the cow happens to have a so-called fleshy udder, it may even feel firm. The atrophied quarter, however, will show evidence of the cause of the atrophy and the absence of any real induration in the other quarter should make diagnosis easy. In cases of doubt, both quarters should be milked out.

Again, many cows show a certain amount of fibrosis in the udder, which does not appear to be due to mastitis. Considering the frequency with which it occurs one can only conclude that the physiological process of continually producing large quantities of milk may be capable of giving rise to fibrous tissue. In such cases the induration is distributed evenly over all four quarters and has an open rough texture. Apart from being more pronounced around the region of the milk cisterns it is entirely different in character from that produced by tuberculous infection.

Oedema

With two exceptions the presence of oedema is not associated with tuberculous mastitis. One of these—the other is dealt with in the next paragraph—is of special interest. In this case the cow is generally of mature age and oedema is confined to one quarter. This is not to be confused with the oedema which is sometimes found at calving in a quarter which is blind, following a previous attack of mastitis and which subsides quickly. The usual history is that normal oedema was present at the time of calving and that it gradually disappeared except that it persisted in this one quarter, and the owner will generally offer the opinion that this is due to the cow lying on the other side. Examination is sometimes very difficult but as the oedema is chiefly confined to the more pendulous part of the quarter and as the accompanying tuberculous lesion is always of the interstitial type involving the whole quarter, diagnosis is generally not difficult as it is usually possible to feel the induration underlying the oedema, which is, in this case, confined to the skin and subcutaneous tissue. If, however, the oedema is such as to obscure the underlying condition, a sample of milk should always be taken for examination, as such symptoms and history are generally indicative of tuberculosis.

Pendulous Udders

The examination of the udder when it is beginning to lose its attachment to the abdomen is often extremely difficult. It is of fair size with oedema affecting all four quarters and is always found in old cows which, of course, are more prone to have tuberculosis. In the majority of instances one can be satisfied after a careful examination that the udder is not affected with tuberculosis since the oedema is generally confined to its lower parts. There are others, however, in which a clinical diagnosis is well-nigh impossible and reliance must be placed on an examination of a milk sample if necessary.

Reactivation of a Blind Quarter

It quite frequently happens that a quarter, which has become affected with chronic mastitis during the dry stage, flares up at the time of calving. When this occurs the teat is usually stenosed, there is slight pain, and the quarter feels tense and turgid. As the whole quarter is always involved, these symptoms distinguish the condition from interstitial tuberculosis.

Mastitis Due to *S. agalactiae*

In the early stages differential diagnosis is easy. The teat duct is thickened and there may be slight pain or swelling with definite clots in the fore milk; these are the outstanding symptoms. As disease progresses or attacks recur, fibrous tissue is gradually formed and there is no doubt that the fibrosis produced as a result of chronic mastitis gives rise to the greatest difficulty in differential diagnosis. It is here that the "feel" of a tuberculous induration coupled with an intimate experience of the other features of tuberculous mastitis are of the utmost importance. The induration due to chronic mastitis has not quite the same substance or body as in tuberculosis. It feels, as a whole, rougher to the touch, closely nodular, and more open in texture. It often gives the impression of a close network of firm convolutions and corrugations, each of which is smooth individually but gives a rough impression when the quarter is felt as a whole. As opposed to tuberculosis, there is a tendency for the bulk of the fibrous tissue to form in and around the milk cistern, thus precluding the possibility of pushing the finger into it. Fibrosis in the postero-superior aspect of the hind quarter when it occurs is not quite so well marked as in tuberculosis and when present in front of the hind teat or behind the fore teat, which is quite common, there is not the same clean-cut division between the fore and hind quarter which is so characteristic a feature of a tuberculous lesion. With chronic mastitis there is a tendency towards atrophy rather than hypertrophy and the even diffuse interstitial induration which is so common in tuberculosis in the hind quarter does not occur with chronic mastitis. Similarly, lesions comparable to tuberculosis nodules are seldom present. In addition, the teat duct always shows varying degrees of thickness and this is best detected by rolling the teat gently between the thumb and the first and second fingers.

Mastitis Due to Staphylococci

Here, again, there is no difficulty in diagnosis during the acute stages, nor does it present any obstacles at a later stage. In the case of staphylococcal mastitis of old standing, there is a greater tendency towards atrophy, irregular fibrosis, stenosis of the teat duct and abscess formation. While it is quite common to find tuberculous abscesses in other parts of the body, we have never seen them in the udder.

Mastitis Due to *C. pyogenes*

After the acute symptoms have subsided, this type of mastitis sometimes leaves an induration affecting the whole quarter, which at first sight is difficult to distinguish from a typical case of interstitial tuberculosis. In such cases, however, the teat duct is very much thickened and the secretion is usually purulent and has a characteristic vile smell, which will leave no doubt as to diagnosis. Even when the secretion is more fluid and odourless, it has a more bronzy-copper tinge than that from a tuberculous quarter.

Mastitis of a Supernumerary Quarter

It is quite common to find these quarters affected with mastitis and they have been diagnosed as tuberculous tumours, but there should be no difficulty in establishing a correct diagnosis. They are always circular or oval and, as already stated, have the feeling of being on the surface of the udder rather than in its substance, as always occurs with a tuberculous lesion. Further, it is quite an easy matter to trace the teat duct, which will be thickened.

Dual Infections

Generally speaking, it was not common in the past to find tuberculosis and other forms of mastitis affecting the same

quarter, where there had been no interference with the udder. On the other hand, one frequently came across primary tuberculosis of the udder and old-standing cases of other forms of mastitis combined where the udder had been inflated for milk fever. With modern methods of treatment for mastitis, however, the position has changed considerably and as is well known it is all too common to find a tuberculous infection superimposed on another type of mastitis as a result of treatment. When a tuberculous infection is introduced in this way, the resulting lesions are generally not difficult to diagnose, but there is always the danger of a previous history of mastitis misleading the examiner. When dual infection does occur and tuberculosis is the last to take place, there is little chance of the symptoms of the non-tuberculous condition obscuring the lesions of tuberculosis. When the infections are reversed, however, diagnosis may not be easy if the time of examination coincides with the acute phase of the non-tuberculous condition. An accurate diagnosis in these cases is well-nigh impossible, but fortunately such circumstances are extremely rare.

Abscesses Due to Injury, etc.

Apart from the possible history of an injury, abscesses, as has already been stated, have not been found in tuberculosis of the udder. Even the resulting cicatricial tissue feels smoother than a tuberculous condition and nearly always adheres to the skin at the point where the abscess bursts or the injury took place.

Nodules of Unknown Origin

These are often felt in the udder and are more common in the hind than in a fore quarter. Each is a separate entity and they vary in size from small shot up to a hazel nut. There may be only one or two or they may be quite numerous. They are spherical and feel as if they contained inspissated material. Otherwise the affected quarter appears perfectly normal in every respect. No literature describing this condition has been seen, but it is suggested that it may be due to acini which have become occluded for some reason or another.

Teat Obstructions

When a teat is partially stenosed due to thickening of the duct, fibrous rings, or a fibrosed sphincter, the corresponding quarter is often enlarged. This is generally due to improper milking caused by the obstruction, a state of affairs which is quite easily detected on palpation. An attempt to milk the quarter will also give a clue to the enlargement. Where the obstruction has been present for some time, however, there is a tendency for the quarter to become slightly fibrosed. The end result is very similar to early interstitial tuberculosis affecting the whole quarter and while an examination of the teat may suggest the true cause, it is advisable to take a milk sample for examination.

Guide Dogs for the Blind.—The Guide Dogs for the Blind Association is preparing to open a second training centre in an attempt to shorten the waiting list of 300 blind men and women who are in need of a guide dog. As our readers are aware (through the active interest of the N.V.M.A.), the association has to rely upon funds from the public for the work, which increases steadily. During 1949 57 dogs were trained compared with 42 in 1948.

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Weekly Wisdom

Man seeks loyalties and ideals to which he can dedicate himself and which will give meaning to his daily life.—Mr. J. J. McCloy, United States High Commissioner for Germany, at The Pilgrims' dinner (April 5th).

THE VETERINARY RECORD

April 22, 1950

TUBERCULOSIS OF THE UDDER

TRANSLATION of clinical observations into words is always difficult, which partly explains the reluctance of clinicians to submit articles for publication. It is, therefore, refreshing to be able to print, in this issue, "Tuberculosis of the Udder and its Differential Diagnosis," which emphasises the accuracy to be achieved by careful development and application of the physical senses alone. It should be observed that the authors do not decry the use of laboratory aids to confirm or deny the opinion formed during direct contact with the patient, but such aids are placed in proper perspective. Man remains master of the machine if, and only if, he utilises his perceptive faculties to the full.

We have reason to believe that the injunction which is implied in the article is timely. There was a period when tuberculosis of the udder was regarded as a subject for the specialist and when its importance was related almost entirely to human health alone. For many years now the duty of detecting and dealing with cases has been spread to most members of the profession who engage in farm practice. As the profession at large accepts the responsibility of affording some protection to the public in this way, it should and as our article suggests, does, from time to time review its achievements with a critical eye.

Assessment of the hazard to human health through tuberculous milk is extremely difficult. It cannot be measured by the number of cases from which the bovine type of organism is recovered nor by those which are classified as "surgical." These are indications that danger exists, not measures of the risk. It has been held that exposure of human beings to the bovine type, while it may claim some victims, has an over-all beneficial effect by creating a degree of resistance to the more dangerous human type. Figures can be quoted in support of this thesis and much argument revolves around it, as has recently been illustrated in our correspondence columns. It can be extended to suggest that young farm stock benefit from contact with one or other of the types. That this may be so when type and dose are carefully regulated, as in the application of B.C.G. vaccine to children or calves, is not acceptable evidence of the general soundness of the proposition, which is unlikely to appeal to those who have experienced disasters, human and animal, traceable to one tuberculous udder. Incapacitating illness and mortality in man have clearly been attributed to all three main types of the organism and the susceptibilities of different animals present a very complex picture so that the idea of conferring resistance by uncontrolled exposure remains a subject of academic interest only. For the present it must be assumed that every case of tuberculous mastitis constitutes a menace to human and animal health, one to be sought and eliminated vigorously.

It is a pleasure to note that this article was submitted by the Editorial Board of *The State Veterinary Journal*, in recognition of the fact that the subject has a far wider interest than is represented by the State Veterinary Officers among whom, alone, the journal circulates.

CLINICAL COMMUNICATION

TREATMENT OF OSTEOMYELITIS IN THE DOG

L. GUY ANDERSON, D.V.M. (TOR.), M.R.C.V.S.

Subject.—Smooth-haired fox terrier bitch, aged about 18 months.

Case History.—It was reported that about six weeks prior to the first examination the patient had been involved in a fight with another dog and had been severely bitten in the foreleg. The wound had healed, slowly, but the animal had developed a lameness which had got progressively worse during the previous fortnight. On examination the thickening could be palpated on the antero-medial aspect of the radius. This was in the form of a circular hard swelling about ¾ inch across with a depression in the middle. Considerable pain was evinced on palpation. Radiographs were taken which showed clearly an inflammatory condition of the periosteum and a pus cavity in the medulla of the bone. (B.S.I.A.: 20.12.49.)

Treatment.—The animal was deeply anaesthetised with intravenous nembutal. The skin over the area was incised and the periosteum was exposed. It was found that the depressed area in the middle of the swelling could be broken down easily and drainage made into the bone cavity. Penicillin oil wax was squeezed into the cavity, and a piece of gauze was soaked in penicillin oil wax suspension and a corner of it was forced through the aperture into the medullary cavity. The wound was left unsutured and the leg set in a plaster cast. The cast was removed in ten days, the wound cleaned up, the gauze removed, and the process repeated. On the removal of the second cast it was found that the piece of gauze had worked out of the bone and healthy granulation tissue was seen in the bottom of the wound which was left open and healed rapidly. The animal was then going sound and free from pain.

Further radiographs were taken about five weeks after treatment ceased. These showed clearly that the cavity of the medulla had filled up and the inflammatory processes of the cortex and periosteum had healed. (B.S.I.B.: 12.2.50.)

Discussion.—There has been considerable interest recently in bone surgery, particularly in relation to the treatment of fractures. It was felt that the above case was worthy of record to show that other types of bone surgery can well be carried out with the facilities available in the average private practice.

SOUTH AFRICA CLAIMED AS "CRADLE OF HUMAN RACE"

"That South Africa might well claim to be the cradle of the human race as a result of palaeontological discoveries in the last 25 years was asserted by Dr. Robert Broom in a statement to the Press to-day," reports the Johannesburg Correspondent of *The Times* in a message dated April 5th.

"'There seems no doubt whatever that we in South Africa have solved the problem of the origin of man,' said Dr. Broom. He recalled many discoveries since Professor Dart's finding of the Taungs ape, and said that the skulls of beings closely allied to that of the ape were found at Sterkfontein, but he believed that they should be placed in a distinct genus because of certain differences in the structure of the teeth. 'In addition to the perfect skull found at Sterkfontein,' he continued, 'we have a perfect pelvis which shows that this being is not all allied to the anthropoid ape, as has been held by some scientists in Europe and America, but that it is a being closely allied to man, and one that walked on its hind legs.'

"This, Dr. Broom declared, removed once and for all any possibility of a close relationship with the chimpanzee and the gorilla. At Swartkrans, where the work has been in progress for the past year, the remains of more than ten individuals have been discovered."

REPORT

[Report of the Medical Research Council for the Years 1945-1948. pp. 283. H.M.S.O., London. 5s. net.]

The Medical Research Council has submitted a report for the years 1945–48. This symposium, which covers a wide field, deals with the activities of the National Institute for Medical Research, the Public Health Laboratory Service, and various research units and external scientific staff whose work is sponsored by the Council. It is impossible to review in full the multitudinous fundamental and applied investigations resulting from the changes from activities designed to meet the emergencies of war, to the planning of peace-time studies in medical science in its broadest sense. An endeavour has been made, however, to select those sections which have some bearing on veterinary science, but the report should be read *in extenso* since there are many aspects of the work of the Council which have a bearing on investigations in the veterinary field.

The important work of Sir Edward Mellanby on the effect of feeding flours improved with "agene" (nitrogen trichloride) to dogs, and the production of symptoms resembling hysteria, has been continued. It is mentioned in the report that about 90 per cent. of all the flour consumed by the population was treated in this manner. There are striking differences in the susceptibility of animals receiving treated flour. So far, dogs and ferrets have been shown to be highly sensitive, but other animals, such as cats and rabbits, can be affected if they are offered flour which has been intensively treated with nitrogen trichloride. Short-term studies on persons eating bread made from treated flour have failed to demonstrate any acute ill-effects, but it is considered not unreasonable to wonder whether increases in some of the chronic diseases of the intestinal tract may be related to the ingestion of articles of diet treated by chemical substances, perhaps over long periods of years. It will be recalled that since the report was issued the use of "agene" as an improver has been discontinued.

During the war extensive trials on the value of penicillin were undertaken. A limiting factor in the penicillin treatment of infective diseases is the failure of this agent to control intestinal bacteria of the coliform group and similar organisms. The discovery that streptomycin has a wider field of application has led to extensive laboratory and clinical trials of this substance, and the Council has undertaken investigations on the value of the drug in tuberculous and non-tuberculous conditions respectively. The preliminary reports have endorsed American experience in showing that the drug is capable of prolonging life in cases of tuberculous meningitis if given sufficiently early in the disease, and is also of value in healing the ulcerations of tuberculous tracheobronchitis. Chemical trials have also shown that the drug is effective in many cases of meningitis, septicaemia and urinary tract infection due to penicillin-resistant gram-negative bacteria. It is unfortunate that streptomycin treatment is liable to produce drug-resistant strains—a resistance which may be permanent. For this reason caution is advocated in the use of this agent.

The staff of the London School of Hygiene have made an important discovery in the field of malaria. Investigators have long been baffled as to the problem of what happens to the malaria parasite from the moment when it is injected by the infecting mosquito until it appears in the red blood cell. Until recently it has not been possible to demonstrate an exo-erythrocytic phase of any parasite closely resembling those of human malaria. However, Shortt and his co-workers have now succeeded in finding these stages of *P. cynomolgi* in the livers of monkeys and subsequently demonstrated several

FIG. 1.—Before Treatment.
(*B.S.I.A.*: *29/12/'49*)

FIG. 2.—After Treatment.
(*B.S.I.B.*: *12/2/'50*)

stages ranging from the earliest forms seen, to mature schizonts liberating merozoites into the tissues of the liver. The picture has been completed by the demonstration of the pre-erythrocytic stages in a human volunteer given a mosquito infection with *P. vivax*.

The production of a suitable vaccine against anthrax has been extensively studied by the veterinary workers in South Africa, and a suitable non-sporing strain has been developed. The late Bruce White has extended work which he carried out on the immunizing properties of anthrax bacilli prepared from blood cultures of a non-sporing strain grown in the guinea-pig and inactivated with toluene, a vaccine which rendered guinea-pigs highly resistant to a test dose of virulent organisms.

Hitherto the potency of vaccines produced from cultures has been affected by constant changes in the bacterial population and the destruction of antigen by the products of metabolism. Workers at the Lister Institute have overcome this difficulty and produced a very potent antigen by a continuous flow method of culture in which the waste products of growth are removed.

In the field of the physiology of reproduction the preliminary work of Rowlands on the effect of hyaluronidase in increasing the fertilising efficiency of an otherwise inadequate number of spermatozoa has not been entirely confirmed, and further work has caused some doubt on the significance of the enzyme in normal fertilisation.

An important contribution has been made, however, to factors affecting the survival of spermatozoa, and considerable attention has been devoted to the effects of variation of *p*H and electrolyte concentrations of diluents for semen to be used for artificial insemination. Various substances have been found which preserve the motility of spermatozoa, probably by preventing the loss of essential material from the cells. These observations may enable much smaller quantities of semen to be used for successful insemination.

The workers of the Institute of Animal Pathology and the Nutrition Institute at Cambridge have, for some time, been working on the constituents of colostrum which prevent infection in the new-born animal. In this report the work had reached the stage that antibodies rather than vitamin A were mainly responsible for the power of colostrum to prevent these infections. The absorption of vitamin A from colostrum in various animals has been studied, and it has been concluded that the lymph is the main pathway by which the vitamin reaches the general circulation. Since this report was written, other work has been undertaken by the Cambridge workers and by the National Institute for Research in Dairying, acting in conjunction with the Royal Veterinary College, London.

The report represents the value of the work which is undertaken by the Medical Research Council, and clearly indicates the wide field which is covered.

R. E. G.

Australian Journal of Agricultural Research.—In January last there appeared the first number of the *Australian Journal of Agricultural Research* (pp. 102; Melbourne: Secretary, C.S.I.R.O., 314, Albert Street, East Melbourne, C.2, Australia; 30s. a year). Under the editorship of Dr. N. S. Noble, this new quarterly periodical is being issued by the Commonwealth Scientific and Industrial Research Organisation in collaboration with the Australian Institute of Agricultural Science and the Australian Veterinary Association. The *Journal* is intended as a medium for the publication of the results of original investigations on problems concerned with soils, plants and domestic animals, and will deal with the physical, chemical and biological aspects of these fields of research.

ABSTRACTS

[Systemic Alkalinization with Sodium Bicarbonate in the Treatment of Cold of Horses. Gonzaga, A. C. (1949.) *Ind. Vet. J.* **26.** 182–186.]

The author, basing his work on the theory that in influenzal types of disease there is an acidosis arising from disturbances of the acid base balance of the body, treated 14 cases of common cold in horses with encouraging results; 200 to 300 c.c. of a freshly prepared 8 per cent. filtered solution of sodium bicarbonate in sterile distilled water was used and administered by slow intravenous injection and repeated, if necessary, at two-day intervals. Cases which received smaller amounts of the solution did not recover as quickly as those receiving larger doses. J. C. G.

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[Dimethylberbeerine Hydrochloride. Note in *J. Amer. vet med. Ass.* **115.** 352.]

This compound is probably a derivative of the alkaloid berbeerine which is a member of the curare group of alkaloids and has similar pharmacological properties. Curare and similar drugs are not anaesthetics but block the myoneural junction making it impossible for the voluntary muscles to respond to nervous stimulation. They are useful in obtaining muscular relaxation during laparotomies. A danger in their use is the blocking of the phrenic nerves. F. A.

REBUILDING OF THE HOUSE OF COMMONS

After four and a half years of work the rebuilding of the United Kingdom House of Commons is nearly finished and it is expected that the new Chamber will be in use by this year's Autumn Session of Parliament. The work of reconstruction began on May 10th, 1945, exactly four years after the old House of Commons was destroyed by bombing, and, by the end of 1949, the main structure and much of the interior fitting and panelling had been completed.

In the rebuilding no attempt has been made to follow the design of the old woodwork or stonework, though the same style of architecture—namely, late Gothic—has been adopted.

The floor of the new House of Commons has exactly the same dimensions as the old Chamber, 68 feet by 45½ feet, but, above the Gallery level, the dimensions of the Chamber have been increased from 46½ feet by 84 feet to 48 feet by 103 feet so as to provide more seating for Strangers and reporters. Altogether, there are now 915 seats within the Chamber, excluding those behind the stone screens, compared with 744 in the old Chamber. The total seating in the new Chamber is made up as follows: Members 437, special Strangers 165, ordinary Strangers 161, reporters 161 and officials 15—a total of 939, including those seats behind the stone screens. The height of the new Chamber is 46 feet compared with 44 feet for the old Chamber. Also embodied in the new building are a number of modern devices to ensure the best possible lighting, heating, ventilation and acoustic effects.

Gifts from the Commonwealth

When completed, a prominent feature of the new House of Commons' interior (states *Commonwealth Survey*) will be the furnishings that have been sent as gifts from each Commonwealth country and from all parts of the Colonial Empire. Australia has contributed the Speaker's Chair and the walnut flooring, which has come from Queensland. Canada has provided the Table of the House and six chairs for the Prime Minister's Conference Room, the latter being a gift from Newfoundland. From Ceylon has come the Serjeant at Arms' Chair; India and Pakistan have each given one of the entrance doors to the Chamber, and New Zealand has sent two despatch boxes. South Africa has provided three chairs for the Clerks' Table, and Southern Rhodesia two silver gilt inkstands for the Chamber.

Gifts of furniture and other articles have so far come from 37 dependent territories within the Commonwealth. These include Ministers' writing desks and chairs from the West Indies and West and East Africa, furniture from Nigeria, Uganda and Singapore, and articles in silver from Malta and numerous other Colonies. The Bar of the House, a long brass rod marking the technical boundary of the House, is the contribution from Jamaica.

NOTES AND NEWS

Diary of Events

Apr. 26th.—Meeting of the South-Eastern Division, N.V.M.A., at Ashford (County Hotel), 2.30 p.m.
April 27th.—Meeting of the Herts and Beds Division, N.V.M.A., at St. Albans (70, Holywell Hill), 7.30 p.m.
Apr. 28th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.
Apr. 28th.—Meeting of the North of Ireland Division, N.V.M.A., at Belfast (Ulster Farmers' Union Hall), 7.15 p.m.
Apr. 28th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (The Hotel Metropole), 2.30 p.m.
May 6th.—Annual Meeting of the Association of Veterinary Officers, at the Royal Veterinary College, N.W.1, 2 p.m. Annual Dinner, 6 p.m.
May 11th.—Meeting of the East Midlands Division, N.V.M.A., at Sutton Bonington, 2.15 p.m.
May 17th.—Spring Meeting of the Eastern Counties Division, N.V.M.A., at Colchester (Red Lion Hotel), 2.15 p.m.
May 18th.—Annual Meeting of the Society of Veterinary Practitioners, in the Holborn Restaurant, London, W.C.1, 2.30 p.m.

N.V.M.A. Council and Committees

The next Council and Committee Meetings of the Association will be held at the Royal (Dick) Veterinary College, Edinburgh, on April 26th, 27th and 28th.

The time-table is as follows:—

Wednesday, April 26th.
11 *a.m.* Veterinary State Medicine Committee.
2.30 *p.m.* Organising Committee.

Thursday, April 27th.
10 *a.m.* Home Appointments Committee.
11.30 *a.m.* Parliamentary and Public Relations Committee.
2 *p.m.* General Purposes and Finance Committee.

Friday, April 28th
11 *a.m.* Council Meeting.

R.C.V.S. Examinations

May 4th.—R.C.V.S. Animal Management Examinations commence at Dublin.
May 9th.—R.C.V.S. Entries for D.V.S.M. Examinations due.
May 15th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Written Examination.
May 17th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Orals and Practicals (London and Dublin).
June 8th.—R.C.V.S. D.V.S.M. Written Examination commences, at Edinburgh.
June 22nd.—R.C.V.S. Membership Written Examination.

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Changes in Designation of Ministry's Veterinary Staff

The Ministry of Agriculture and Fisheries have decided that in future the term "veterinary inspector" will be replaced by "veterinary officer": the following will now be the designations:—

Veterinary Officer for Veterinary Inspector; Divisional Veterinary Officer for Divisional Veterinary Inspector; Superintending Veterinary Officer for Superintending Veterinary Inspector; Chief Superintending Veterinary Officer for Chief Superintending Veterinary Inspector.

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PERSONAL

Birth.—Wait.—On March 14th, 1950, at Calverts House, Westhorpe, Southwell, to Phoebe (*née* Moon), wife of Philip Wait, M.R.C.V.S., a son, Andrew Philip.

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Marriage.—Collyns—Neale.—On Saturday, April 15th, 1950, at Lexden Parish Church, Colchester, David John Collyns, younger son of the late G. N. Collyns and Mrs. B. Collyns, of Forest View, Ascot, and Addison Janet Neale, daughter of Mr. and Mrs. H. J. Neale, of 5, Victoria Road, Colchester. Captain P. Storie Pugh was best man.

FOLMER NIELSEN

A Further Tribute

Major L. P. Pugh, of Sevenoaks, writes:—

"May I be permitted to endorse all that H. W. Steele-Bodger and S. L. Hignett have said in their tribute to Folmer Neilsen. It was a great privilege to me to open the discussion on his discourse at Aberdeen in 1924, yet it was characteristic of his generosity that he should send me, on returning home, a set of his instruments for, as he put it, so 'keenly supporting me at Aberdeen.'

"In his passing the veterinary profession the world over has lost not only a great master but a very good friend. Better praise can hardly be paid to any man and I am sure that all veterinarians in this country hope most sincerely that this may prove some little consolation to his family in their irreparable loss."

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PHARMACEUTICAL SOCIETY OF GREAT BRITAIN

Veterinary Codex Committee

At the April meeting of the Council of the Pharmaceutical Society of Great Britain, it was reported that the President (Mr. H. Clement Shaw), with the authority of the Council, had appointed the following to be members of the Veterinary Codex Committee:—

L. G. Anderson, M.R.C.V.S., D.V.M.; J. W. Bruford, M.R.C.V.S.; J. P. Byron, M.P.S., A.R.I.C.; J. Carmichael, D.Sc., M.R.C.V.S., Dip. Bact.; Professor T. Dalling, M.A., M.R.C.V.S.; F. J. Dyer, Ph.D., Ph.C., A.R.I.C.; A. G. Fishburn, Ph.C., F.R.I.C., D.P.A.; G. Hall, M.P.S.; H. G. Lamont, D.Sc., M.R.C.V.S.; C. W. Maplethorpe, Ph.C., F.R.I.C. (Chairman); R. F. Montgomerie, B.Sc., Ph.D., F.R.C.V.S. (Vice-Chairman); R. Neal-Morris, M.R.C.V.S., M.P.S.

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THE BRITISH COUNCIL

In our notice of the report of the British Council for the year 1948-49 (*Vet. Rec.* **62.** 156) we drew attention to the facts that there is no veterinary panel amongst the numerous Advisory Committees of the Council and that until the year under review there was no veterinary representation whatsoever, one veterinary surgeon having then been appointed to the Agricultural Panel.

As the representative concerned, Mr. Thos. Dalling, Chief Veterinary Officer of the Ministry of Agriculture and Fisheries, writes: "It is only recently that I have been made a member of the Agricultural Panel and a representative of that Panel on the Science Committee. In addition, however, my advice is always sought on any veterinary matter, *e.g.*, arranging for visits from veterinarians from other countries."

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VETERINARY RESEARCH IN EAST AFRICA

A Correction

In the "News from Overseas" section of our issue of March 11th (page 137) there appeared the following paragraphs:—

"The East African Veterinary Research Organisation is taking over the old Kenya Veterinary Research establishment near Nairobi, and will share an Animal Husbandry Section with the East African Agriculture and Forestry Research Organisations.

"A Colonial Development and Welfare research grant of £15,800 has been made to East African territories in order to finance three years' research into the control of trypanosomiasis by means of antrycide."

A correspondent from the Kenya Veterinary Research Laboratory writes: "There would appear to be some misapprehension regarding the siting of the East African Veterinary Research Organisation (E.A.V.R.O.). The Veterinary Research Laboratory of the Kenya Department of Veterinary Services is situated at Kabete, eight miles from Nairobi. All central activities of the E.A.V.R.O. will be situated on an extensive area of land, made available by the Government of Kenya, in the Muguga Forest Reserve about 20 miles from Nairobi, and there is no question of the Kabete Laboratories being taken over by the E.A.V.R.O. The East African Agriculture and Forestry Research Organisation will also be situated at Muguga and the two Organisations will have a joint section for research on animal husbandry. Until the new centre has been established at Muguga, the majority of the E.A.V.R.O. staff are working at Kabete in temporary accommodation established by the E.A.V.R.O. and accommodation kindly provided by the Kenya Department of Veterinary Services.

"The grant, from Colonial Development and Welfare Funds, of £15,800 for research on antrycide has been made to the East African Tsetse and Trypanosomiasis Research and Reclamation Organisation. This research is being carried out under the combined direction of E.A.T.T.R.R.O. and E.A.V.R.O., both Organisations providing staff for the project."

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THE AMERICAN COLLEGE OF VETERINARY PATHOLOGISTS

In January of last year we recorded the establishment of the above post-graduate college in recognition of the need for joint effort to solve the specialised problems in teaching, research and practice of veterinary pathology. We are glad to learn from Dr. J. R. M. Innes, M.R.C.V.S., who has been made one of the original Chartered Members, that this new venture, which our American colleagues have much at heart, is making steady progress under the Presidency of Dr. William H. Feldman, of the Mayo Foundation for Medical Research. Doubtless in this country, as the hampering effect of total concentration upon the prosecution of the war diminishes, the former demand for increased facilities for post-graduate study will regain impetus. In the meantime, whatever application such a project as the above may have for us—and it is admitted that in the U.S.A. there is a greater divergence of standards at least in general veterinary education subsequent to graduation—we would wish the American College success in the attainment of its objectives, which include the encouragement of veterinarians to enter the field of veterinary pathology and the acquirement of a high standard of competence, to be recognised by the award of a suitable certificate. The project is being carried on under the aegis of the American Veterinary Medical Association.

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HERD IMPROVEMENT: PLANNED PROGENY TESTING

In view of the important developments in the above field to which it refers and upon which informative comment is made, we reproduce the leading article in the April 14th issue of *The Farmers' Weekly*:—

Since its marketing powers were shorn by the Ministry of Food, the Milk Marketing Board has increasingly devoted its knowledge and resources to measures for the assistance of milk production. The fruits have been seen, in particular, in the development of the A.I. service, which will eventually have a stud of almost 1,000 bulls; in milk recording, the progress of which has lately been marked by emphasis on quality as well as quantity, and in the more recently established Bureau of Records, which is of great value in measuring the real qualities of a dairy bull.

The progeny recording plan, which is the latest contribution, arises naturally from these. Such a scheme, indeed, would not have been possible but for the work already done by the Board and the thousands of farmers co-operating with it. The plan represents a great step forward in dairying improvement in this country, and since it is to be developed on a large scale and by new methods, it will excite the interest of farmers not only here but in all progressive dairying countries.

Five out of eight milk producers in England and Wales keep fewer than 15 cows, and it is therefore difficult for the average farmer to carry out a constructive breeding policy. Even among recorded herds, there is an average of less than six daughters per bull, and the real merit of a bull is rarely properly assessed.

For some years now, interest in the subject of general herd improvement has been awakening. Small farmers belonging to Board centres have seen what can be done by getting more profitable cattle and eliminating the breeding of "passengers." On a higher, more specialised, plane, the Cattle Breeders' Club and others have done much to disseminate knowledge of the genetical and environmental factors involved in breeding for production.

The object of the Board's new plan is, in effect, to apply the technique of the plant breeder's field trial to the proving of bulls. Differences of environment make it notoriously difficult to prove the real worth of a bull in a single herd. The milk recording and A.I. services, however, provide a wide field for planned progeny testing, and the herds of co-operating members will represent the "replicated plots" in the trials, just as a corn grower's fields may be used in trying out new plant varieties. By this means, large numbers of bulls can be tested and direct comparisons of many kinds can be made. Teams of young bulls can be used on "proving" herds to obtain early and reliable first-calf records.

The value of such large-scale proving is bound to be immense. In one respect alone it can result in a big saving in herd replacements, simply by eliminating those errors which lead to the birth of the "passenger" cow. We may also expect the work to throw fresh light on problems of fat and solids content, which have lately assumed such importance.

The Board is obviously keen to ensure that the information gained is used to the fullest advantage, and in commending the plan to farmers we commend, too, the manner of its framing, which makes the farmer an interested partner in the work. But the farmer will also have his responsibilities if all the results hoped for are to be obtained. The greater our contribution to the work, the more likely are we to reap the advantage in more efficient breeding and more profitable dairying.

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A.H.T. STUD MANAGERS' COURSE

The first course for stud owners and managers ever held in this country, organised by the Animal Health Trust at its Equine Research Station, Newmarket, at the request of the Thoroughbred Breeders' Association, ended on April 5th.

All attending the course were members of the Thoroughbred Breeders' Association; for ten working days they listened to lectures and saw demonstrations by a cadre of 12 specialist instructors. Much of the practical work was made possible by the invaluable co-operation of the owners and managers of some of the leading studs in the Newmarket area, including Banstead Manor, Beech House, Hamilton, Snailwell, Someries, Stetchworth and Woodlands.

To present a complete picture, the subjects covered ranged from elementary anatomy, pathology and bacteriology, to those of more immediate practical interest to stud managers—including conformation, markings, care of teeth and feet, physiology of the male and female, trying and covering, management of mares and stallions, infertility, parasitism, ventilation, drainage and disinfection, hygiene, foods and feeding, diseases of mares and foals (clinical and research aspects), methods of farming a stud and taxation, pasture management, foaling and stud management in the U.S.A.

The course was arranged and conducted by the staff of the Equine Research Station, who wish to acknowledge the invaluable assistance generously given by Messrs. E. Brayley Reynolds, Fred Day, R. C. Crowhurst, Marcus Wickham Boynton, Moses Griffith and Walter Griffiths, and also the help and assistance given by Mr. Adrian Scrope, who conducted the tour of the Woodlands Stud.

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POULTRY SCIENCE CONFERENCE

Fowl Paralysis

Addressing a recent conference of the United Kingdom Branch of the World's Poultry Science Association, Mr. C. le Q. Darcel, B.Sc., M.R.C.V.S., of the Animal Health Trust, pointed out that fowl paralysis was making ever-increasing inroads on the farmer's profit margin, that steadily dwindled with the country's return to a peacetime economy. He struck a hopeful note, however (adds the *Farmer and Stock-Breeder* report), when he said: "If the tempo of the remarkable advances in our knowledge of the disease that have been made in the last few years, largely in America, is maintained, then the future is indeed a promising one."

Control and prevention were dealt with by Mr. J. E. Wilson, B.Sc., M.R.C.V.S., of the Ministry of Agriculture. At the veterinary laboratory, Eskgrove, Midlothian, it had soon become evident that to be successful isolation must commence immediately after hatching, and all contact with adult stock, direct or indirect, should be avoided for at least six to eight weeks. The degree of isolation possible under practical conditions would depend on the type of farm and the facilities available, but its efficacy had been proved at Eskgrove by rearing two large groups of chicks, the produce of the same parent stock, from day-old (*a*) on completely fresh ground and in thoroughly sterilised houses and (*b*) on land where serious losses had occurred in successive years. The experiment lasted for two years and at the end of that time mortality due to fowl paralysis in stock on the clean ground was 1·11 per cent. compared with 31·4 in the birds on the contaminated ground.

Mr. D. J. G. Black, Reading University, said that there was ample evidence that by orthodox selection methods, including mass selection as well as the more elaborate progeny testing schemes, it was possible to build up genetically resistant strains of fowls. Mr. Black asked: "When a flock is first attacked by fowl paralysis, is it better to scrap the lot, buy in fresh stock and place it in 'clean' quarters; or should one breed from the survivors and rear the young stock under reasonable conditions of isolation?" The latter course, he thought, was probably the better, with the proviso that the survivors were not bred from as pullets but only as hens. He believed that breeding haphazardly from pullets of unknown ancestry in the presence of the fowl paralysis virus was responsible for much of

our present-day trouble. Mr. Black suggested, as a practical approach, that there should be concentration on breeding for longevity in stock, ensuring constitutional vigour.

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Since 1939 Devon's farm horse population has dropped by nearly 15,000 and Cornwall's total of heavy horses has been nearly halved since 1941.

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No hamsters are to be allowed into the Isle of Man as it is considered that they could become a menace to agriculture if they escaped and became acclimatised in a wild state.

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Scheme for the Control of Diseases of Dairy Cattle

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE QUARTER ENDED MARCH 31ST, 1950

County	Undertakings Notified		Total Undertakings	Number of Cattle	
	During Quarter	Previously		Cows	Heifers
ENGLAND					
Bedford	—	1	1	1	11
Berks	1	20	21	579	446
Bucks	—	3	3	88	74
Cambridge	—	—	—	—	—
Cheshire	28	36	64	2,308	1,077
Cornwall	—	—	—	—	—
Cumberland	—	2	2	96	90
Derby	16	111	127	3,647	2,027
Devon	—	60	60	803	494
Dorset	—	—	—	—	—
Durham	3	78	81	2,217	1,008
Essex	5	56	61	2,876	2,144
Gloucester	1	12	13	401	503
Hampshire	4	49	53	1,913	1,934
Hereford	—	3	3	161	106
Hertford	1	20	21	743	508
Hunts	—	—	—	—	—
Isle of Ely	—	—	—	—	—
Isle of Wight	—	—	—	—	—
Kent	3	38	41	1,003	676
Lancs	1	21	22	736	245
Leics	4	39	43	1,236	1,055
Lincs (Holland)	—	—	—	—	—
Lincs (Kesteven)	—	6	6	86	121
Lincs (Lindsey)	—	3	3	67	63
Middlesex	—	2	2	32	10
Norfolk	—	21	21	904	573
Northants	—	12	12	226	355
Northumberland	2	21	23	718	666
Notts	6	72	78	2,010	925
Oxford	—	2	2	77	110
Rutland	—	—	—	—	—
Salop	4	27	31	6,963	656
Soke of Peterborough	—	—	—	—	—
Somerset	1	53	54	1,633	987
Staffs	—	60	60	1,857	1,252
Suffolk (East)	—	6	6	62	125
Suffolk (West)	5	6	11	400	309
Surrey	1	20	21	769	436
Sussex (East)	1	19	20	631	384
Sussex (West)	1	17	18	483	394
Warwick	2	43	45	1,368	656
Westmorland	—	3	3	47	23
Wilts	—	5	5	146	78
Worcester	4	66	70	1,529	879
Yorks (E.R.)	1	19	20	308	302
Yorks (N.R.)	—	36	36	720	476
Yorks (W.R.)	—	52	52	1,479	517
TOTAL, ENGLAND	95	1,120	1,215	41,323	22,695
WALES					
Anglesey	—	9	9	148	84
Brecon	—	—	—	—	—
Caernarvon	—	13	13	217	98
Cardigan	—	17	17	446	267
Carmarthen	—	47	47	923	488
Denbigh	—	6	6	138	58
Flint	—	16	16	369	176
Glamorgan	—	24	24	397	215
Merioneth	—	—	—	—	—
Monmouth	1	5	6	133	90
Montgomery	—	1	1	15	2
Pembroke	—	5	5	181	197
Radnor	—	1	1	5	1
TOTAL, WALES	1	144	145	2,972	1,676
TOTAL, ENGLAND AND WALES	96	1,264	1,360	44,295	24,371

Notes.—(1) Operative periods of undertakings: 1 year, 314; 2 years, 65; 3 years, 981. (2) Undertakings renewed for further periods: 1 year, 34; 2 years, –; 3 years 38. (3) Undertakings not renewed at end of, or cancelled during, operative periods: 158. (4) The figures showing the number of undertakings notified during the quarter relate to entirely fresh undertakings and do not include undertakings renewed for further periods. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings in Force		
	During Quarter ending 31.3.50	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	1	11	12	597	363
Angus	—	7	7	454	237
Argyll	—	—	—	—	—
Ayr	1	2	3	104	77
Banff	—	—	—	—	—
Berwick	1	—	1	24	11
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	—	—	—	—
Dumfries	—	1	1	70	50
Dunbarton	—	1	1	12	10
East Lothian	—	—	—	—	—
Fife	—	18	18	677	447
Inverness	—	1	1	52	35
Kincardine	—	1	1	40	50
Kinross	—	2	2	47	28
Kirkcudbright	—	1	1	450	550
Lanark	—	1	1	36	22
Midlothian	—	—	—	—	—
Moray	—	—	—	—	—
Nairn	—	—	—	—	—
Orkney	—	—	—	—	—
Peebles	—	—	—	—	—
Perth	—	5	5	139	98
Renfrew	—	1	1	31	34
Ross-shire	—	1	1	85	10
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	3	3	137	140
Sutherland	—	—	—	—	—
West Lothian	—	1	1	17	29
Wigtown	—	2	2	185	119
Zetland	—	—	—	—	—
TOTAL	3	59	62	3,157	2,310

Notes.—(1) Duration of undertakings: 1 year, 16; 2 years, Nil; 3 years, 46. (2) Undertakings renewed for a further period: 1 year, 4; 2 years, Nil; 3 years, Nil. (Included in the second column of the statement). (3) Undertakings expired and not renewed: 9 (Not included in the second column of the statement).

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MINISTRY OF AGRICULTURE NEWS SERVICE

Farm Horses.—The decline in the number of farm horses is giving cause for alarm. The total number of horses of all types on agricultural holdings in the United Kingdom in 1939 was 1,083,900; in 1949 it was only 617,000. To a large extent the horse has been ousted by the tractor; but tractors depend upon imported fuel oil, whereas the horse proceeds "under his own steam" generated by home-grown food. Assuming the certainty of supplies of tractors, fuel and spare parts, are there not still occasions on most farms when the horse can be more suitably employed than the tractor? Certainly the smaller farms with about 100 or 125 acres of arable land and possessing only one tractor cannot dispense with horses. They will need at least two. The tractor is particularly useful for getting heavy work done quickly (such as ploughing and other cultivations after harvest and in the spring rush), while horses attend to the lighter work and the odd jobs. But for satisfactory cultivation by tractor the ground needs to be drier than for horses. Under wet conditions soil texture can be ruined by undue compression. There are occasions, however, when consolidation by tractor is advantageous, as when dealing with ploughed-up turf. For mowing and reaping the tractor is also preferable. But when carting corn, if the work is to be done expeditiously and economically, a single tractor should be used to haul the loads to the stack, with a horse in the field pulling the trailer, in course of loading from stook to stook.

For weeks on end in winter the ground may be too soft for tractor haulage and the foddering of stock can be done only by horses.

It seems essential that a nucleus of breeding stock should be maintained. We are now at the beginning of the normal breeding season. The birth-rate in horses is comparatively low. Fertility percentage tends to be higher on farms where a stallion is kept than when travelling stallions are used. This is probably due in part to the more natural conditions, since the period of heat may be anything from three to 15 days, with an average of six days. Service about two to four days before the end of the heat period is more likely to be fertile than service at the beginning. And, speaking generally, the more regularly an animal is bred from, the more likely it is to retain a condition of fertility. In commercial horse breeding by the small farmer it is probably best that fillies, if well grown, should be bred from in their third year before engaging in regular work. There would then be more likelihood of their preserving fertility. After foaling, heat occurs again about

the seventh to eleventh day, at which time it lasts only about three or four days instead of the usual week. Mares "hold" easily then and sometimes do not come into service while they are suckling a foal.

Farmers will have received the usual notices regarding the stallions available in their neighbourhood. They should seriously consider breeding a foal or two that will "grow into money" and stand them in good stead whatever the future may bring forth.

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Beef from Dual-purpose and Dairy Cattle.—We need more store cattle for feeding. They are required to convert straw into manure, to make the best use of the increased acreage of new leys and, subsequently, to increase the supply of home-produced beef.

During and since the war years milk has been priority number one. There are signs, however, that liquid consumption is reaching saturation point. Already the 1952 production target has been reached, due principally to improved methods of breeding and management of cattle, cropping and grassland. On the other hand, store cattle for feeding are still scarce and their prices are often so high as to make profits for the feeder small.

In the future most of our beef stores will have to come from dual-purpose cows, and the thicker fleshed type of dairy cow unsuitable for breeding dairy replacements crossed by a beef bull. Fortunately, there are in this country many breeds of cattle especially suited to its varying conditions. The extreme dairy-type of animal has spread from its natural habitat all over the country; but the same cannot generally be said of the dual-purpose breeds indigenous to different parts of the British Isles. Certain breeds have, however, become popular away from their usual environment, and, with the advent of multiple suckling—a method by which several calves can be reared successfully on one cow—there is now a large demand for calves suitable for rearing as beef stores.

In the past bull calves surplus to requirements have been the chief source of supply and will continue to be reared. These have been very successful where the herd has retained its dual-purpose character.

To maintain sufficient suitable replacements for the herds it is essential to breed only from the best cows and rear only those heifer calves which, by virtue of their breeding, give every prospect of becoming efficient dairy cows. The remaining cows in the herd can be mated to beef bulls, and their offspring, both male and female, sold for rearing for breef production.

It is important, when making such crosses of beef bulls on dual-purpose cows, that the bulls used should be those which colour-mark their calves. In this way the calves produced will be easily distinguished from the pure dual-purpose breeds, and the buyer will know exactly what he is purchasing. For this purpose bulls of the beef breeds, such as the Hereford, which leaves white-faced calves, or the Aberdeen-Angus, which leaves black or blue-grey calves, are particularly useful.

The introduction of the artificial insemination service from colour-marking beef bulls has made it possible for farmers to obtain the semen of beef bulls for use on those of their cows which, while being low yielders, are still capable of producing a good beef store. This is a good scheme, because those cows which have to be culled for low yielding can produce something worth rearing when mated to a beef bull; whereas, had they been mated to a bull of the same breed as themselves, the heifer calves would, in all probability, subsequently have found their way into the dairy herd as very inefficient milkers.

It is possible that in the future, as more herds become attested and their efficiency is increased, there will be a smaller wastage of cows.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

BOVINE INFERTILITY

Sir,—I have read the abstracts of the papers by various workers on the above subject in *The Veterinary Record*, page 186, No. 13, Vol. 62.

I was particularly interested in the type of infertility described by I. G. Shaw. He states that "before purchase and after sale to local farmers the fertility of these cattle was normal." This would obviously point to some factor of herd management or environment accounting for the trouble.

In certain bull studs in A.I. Centres in this country a somewhat similar type of infertility seems to have occurred. When the bulls were changed to another Centre their conception rates went up.

There has been a tendency to describe this as due to a psychological cause, but it is difficult to see how the trouble in the female can be attributed to psychological aetiology.

I am wondering if there is not some common factor responsible for this type of infertility in both sexes.

Yours faithfully,

Milk Marketing Board, K. O'Sullivan.
Cattle Breeding Centre,
Tean, Stoke-upon-Trent, Staffordshire.
April 12th, 1950.

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ATTESTATION: IS IT A GOOD POLICY?

Sir,—I am grateful to Major Hancock and subsequent correspondents for their helpful contributions to the discussion of this question, which I raised in your issue of February 4th. My comments thereupon have been deferred in the hope of presenting a reasonably comprehensive reply.

I appreciate greatly the details Major Hancock was good enough to give regarding his son. Of course I knew the boy well and am very thankful to know that he is maintaining his good health.

Regarding his remarks about tuberculosis and contagious abortion in cattle, undoubtedly nutrition is a very vital factor in both conditions, but we have all seen herds which are managed in the best possible way fall foul of both diseases; in fact I know the herd which took second prize in the Berks Herd competition in, I think, 1928, and became infected with contagious abortion—there was no S.19 in those days—and it eliminated the herd and the farmer.

I really have my doubts whether the presence or absence of artificial fertilisers in agricultural economy would influence greatly the incidence of these two diseases, as the whole object of manuring is to enable the land to support more stock or better crops, but I am convinced that the humus content of normal manure is extremely important as was shown by F. Sykes, late of Langley, Bucks. Major Hancock's remarks regarding the reduction of pathogenic organisms to a degree where they are merely symbiotic are extremely interesting: to my mind, this is the essence of immunity.

Mr. W. J. Daniel is correct in stating that my letter should have stressed that 80 per cent. of the milk supply in Scotland is from attested cattle, not that 80 per cent. of all cattle are attested. The fact that only 15 per cent. is sold as designated milk does not alter the issue. My belief is that the products of the organisms are absent in milk from tested cows and that the higher degree of attestation the higher will be the deficiency. The inference that a bucket full of ordinary milk will supply this loss in 1,000 gallons is too academic for me to contradict, but the statistical evidence shows that tuberculosis, human type, is on the increase all over Scotland (I quote "Scottish Estimate" July 6th, 1949, which emphasises the serious state of affairs not only in Glasgow but also in Ross and Cromarty, which is entirely rural in nature).

Animal health is the profession's responsibility in the main, but what is the good of freeing cattle from tuberculosis if we are exposing ourselves to the same type of infection?

In many ways I am extremely sorry to have to mention Scotland so many times. Some of my best friends are from that side of the border, but I feel that an experiment has been unwittingly carried out in that country which may be extended unless we associate the connection between absence of tuberculosis in cattle on the one hand and a striking increase in human beings on the other: this is a fact and no theory.

In reply to Mr. Richard W. Hillman, the figures given are issued by the Ministry of Health and are therefore in themselves irrefutable. I feel certain that the absence of the products of the bacilli (which I have called "tuberculin") is removing nature's own method of conferring immunity on human beings. Broadly speaking, almost universal attestation in Scotland has coincided with a countrywide increase in tuberculosis in human beings there, whereas in England, where attestation is not so generally the rule, the incidence is regularly on the decline, except in London which shows a very slight increase—but there, as in Glasgow, housing conditions are probably the answer. Although it is impossible to dissect the figures into age groups or modes of life, the total figures of certified affected persons are, I think, the significant feature.

I certainly do not favour uncontrolled infection running rife, but I think by clinical experience, coupled with competent biological examination, it is possible to keep the disease under control. While it would be presumptuous of me to disparage the writings of John Francis, I know literally thousands of herds which have never had an animal tested where the cows live a normal life

and presumably have had lesions, have survived and thereby have acquired immunity. I do not believe in pasteurisation as a principle but consider it a necessary policy to safeguard the public against milk from attested herds which in our part of the country are much more commonly affected by mastitis than are the non-designated herds; by pasteurisation, if the process is effectively carried out, any tubercle bacilli will be destroyed.

I cannot say how much tuberculin is required to confer immunity. Regarding BCG vaccination, how many people over the age of five would be free from infection and therefore suitable subjects for such treatment?

Mr. K. G. Luckin, in his letter, expresses the opinion that tubercle bacilli should not be present in milk. With that I must humbly agree. But I think we must look infinitely farther and consider the position as it stands: the total absence of infection is leading to a corresponding decrease in the natural immunity of human beings to the infection. He mentions adding tuberculin to milk after pasteurisation or swallowing capsules of tuberculin at intervals; the efficacy of such procedures I must leave to others to discuss.

Mr. Luckin is correct in asserting that the notified cases for Glasgow comprise one-third of the total for Scotland: he, too, assumes that the housing conditions are the major cause, but may I inform him that all the slums, bad as housing conditions there are, do not exist in Glasgow? They are bad also in Birmingham and Cardiff and in both of these cities the rates are on the decline.

Milk has not been imported from Northern Ireland into Glasgow since January, 1949. I quote Dr. Stuart I. A. Laidlaw, Medical Officer of Health, Glasgow 20/3/50, "Previously pasteurised or heat treated milk was sent from the North of Ireland to Glasgow during the months October to March each year. This Irish milk was found to be of good quality both chemically and bacteriologically. It has now been replaced in Glasgow by supplies from creameries situated in the South of Scotland."

The actual figures for Glasgow are:—

Year	Pulmonary	Non-Pulmonary
1930	1,687	1,047
1932	1,722	957
1934	1,646	677
1936	1,647	711
1938	1,748	700
1940	1,909	669
1942	2,324	714
1944	2,758	671
1946	2,809	508
1948	2,775	373

It will be seen from these figures that the significant period is around 1936 (when the attested scheme commenced) after which there is a very steep rise in the incidence of the disease. Non-pulmonary disease has lessened, but that is normally not a killing disease. I feel that these figures indicate that the absence of bacterial (tubercle) products is a big factor in susceptibility to the infection.

Undoubtedly the shortage of nurses is a very real problem, as also is lack of sanatorium space, but I feel convinced that the need for so great an increase in such accommodation is the result of misguided experimentation which has reduced the resistance to the disease.

Yours faithfully,

L. Pitcher.

66, Coningsby Road,
High Wycombe,
Bucks.
April 6th, 1950.

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NO FOOT—NO HORSE

Sir,—Major G. K. Shaw, in his letter published in your issue of April 15th, invites a reader to give a short account of Jeremiah Bridges, who was judged one of the most noteworthy authors on a veterinary subject during the era immediately preceding the opening of the veterinary schools. This author and the one book by which he is remembered are discussed with characteristic thoroughness by the late Major-General Sir Frederick Smith in "The Early History of Veterinary Literature and its British Development," Volume 2, pp. 62-69 (1926, London: Baillière, Tindall and Cox).

Bridges's work "No Foot—No Horse, an Essay on the Anatomy of the Foot of that noble and useful animal a Horse . . . together with particu'ar directions for the cure of some of the chief Internal Diseases which horses are subject to" was published by J. Brindley, "Bookseller to the Prince of Wales, in New Bond Street," in 1751, Bridges describing himself on the title page as "Farrier and Anatomist." A second edition appeared in 1752. A reprint of the section on general diseases was published separately, in 1759, under the title of "The Gentleman and Farrier's Guide." Concluding his review upon the above work Smith says, "Bridges, as the first Englishman to describe fully the anatomy of the foot, must ever be remembered. His physiology is equally good; he recognised that the weight of the body was carried on the laminae 14 years before Coleman was born, while it is obvious from his remarks on the function of the lateral cartilages that he understood the foot was not an inelastic body.

"His observations on purging, bleeding, nursing and the avoidances of drugs do honour to his judgment and wisdom. *He influenced the thoughtful and the wise, as we shall see when James Clark, of Edinburgh is studied, but he was too advanced in his views to influence public opinion, and his work would probably have been of greater effect had he lived 40 years later.*" (These final words are italicised by me not only because they convey fittingly the impression left upon the mind of a ripe historian by a remarkable personality but also because they may be taken to constitute in effect a general judgment the essential truth of which is now forthcoming from Major Shaw's own questing for more enlightenment upon that personality almost exactly two centuries after it had given to a world "which received him not" a work containing a precept of great and enduring value. The many worthless works, often running to several editions, that obtained a surprisingly large circulation during this bleak era, on the other hand, prove to have bequeathed to posterity no teaching whatever of lasting value. Hardly anything comparable in value to Bridges's work appears until the works of James Clark, of Edinburgh, were published not long afterwards during the century.)

Smith tells us nothing is known about Bridges beyond the facts that he had "a shop at the Bucephalus Head, Orange Street, Leicester Fields, London, and he delivered a course of lectures, presumably on the subject of his calling. . . . He was undoubtedly in practice, for his work bears evidence that he was not an arm-chair author; he might even, judging from his style, have been an educated man; on the other hand, his work may have undergone literary revision by his publisher." Smith has no doubt that Brindley, the publisher, was the driving force in the production of the book.

Yours faithfully,

J. T. Edwards.

University of London Club,
21 Gower Street,
London, W.C.1.
April 15th, 1950.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Mar. 16th to 31st, 1950	22	3	16	—	—	1
Corresponding period in—						
1949	7	3	22	—	5	—
1948	4	—	20	—	3	—
1947	1	6	25	—	1	4
Jan. 1st to Mar. 31st, 1950	126	12	52	—	18	1
Corresponding period in—						
1949	41	9	123	—	26	4
1948	29	—	149	1	21	7
1947	16	83	27	1	14	14

Note.—The figures for the current year are approximate only

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at March 31st, 1950, was as follows:—

England	Wales	Scotland	Total (Great Britain)
20,568	14,204	12,527	47,299